REMARKS

In section 3 of the Office Action, the Examiner rejected finally claims 1, 3-8, 11-15, 31-33, and 36 under 35 U.S.C §102(e) as being anticipated by the Daughton patent.

The Daughton patent discloses a signal isolator formed as a portion of a semiconductor chip 10. An insulating layer 11 is provided over a first metalization interconnection network 12 to form a part of an upper surface 13 of the semiconductor chip 10 after a second and final chip metallization that forms a metalization interconnection network 14. The metalization interconnection networks 12 and 14 are provided on the semiconductor chip 10 for interconnecting various integrated circuit components.

The semiconductor chip 10 includes a NiFeCo alloy layer 16 and a CoFe alloy layer 17. The NiFeCo alloy layer 16 is provided on a base metal layer 15. The CoFe alloy layer 17 is provided on the NiFeCo alloy layer 16 and has a magnetic saturation induction that is higher than that of the NiFeCo alloy layer 16. An intermediate nonmagnetic electrical conductor layer 18 is provided on the CoFe alloy layer 17. A hard ferromagnetic thin-film CoFe layer 19 is formed on the intermediate nonmagnetic

electrical conductor layer 18. An antiferromagnetic IrMn layer 20 is formed on the hard ferromagnetic thin-film CoFe layer 19. A tantalum passivation layer 21 is formed over the antiferromagnetic IrMn layer 20. An etch stop layer 22 is deposited on the tantalum passivation layer 21. A photoresist is deposited and patterned with a photomask, and etch and milling steps are performed to form four separated magnetoresistors 23A, 23B, 23C, and 23D which serve as members of a current sensor bridge circuit. The magnetoresistors 23A, 23B, 23C, and 23D are connected to leads 24A, 24B, 24C, 24D, 24E, 24F, 24G, and 24H.

The leads 24A and 24D connect the magnetoresistors 23B and 23D together, and the leads 24B and 24C connect the magnetoresistors 23A and 23C together. The lead 24E connects the magnetoresistors 23A and 23B to a positive voltage supply. The lead 24F connects the magnetoresistors 23C and 23D to a ground reference. The lead 24G is connected to the junction between the magnetoresistors 23A and 23C to form a first bridge output which is coupled to an input of an amplifier. Similarly, the lead 24H is connected to the junction between the magnetoresistors 23B and 23D to form

a second bridge output which is coupled to another input of the amplifier.

A silicon nitride insulating layer 25 is deposited over the magnetoresistors 23A, 23B, 23C, and 23D and the associated leads 24A-24H. Openings are formed through the silicon nitride insulating layer 25 to provide appropriate connections to the bridge. An electric field interrupter layer 26B is provided over the silicon nitride insulating layer 25 and is connected to the ground reference.

A dielectric layer 27 is provided between an input coil 29 and the electric field interrupter 26B, and also between the magnetoresistors 23A, 23B 23C, and 23D and the electric field interrupter 26B. A mechanically stiffening layer 28 is provided on the dielectric layer 27 to provide a firmer base for supporting the input coil 29. The input coil 29 and corresponding pads 30 are then formed.

A further dielectric layer is then coated on the input coil 29, the pads 30, the exposed sides of he stiffening layer 28, the exposed surfaces of the dielectric layer 27, and the exposed surfaces of the interconnection network 14 leaving expose portions of the relevant bonding pads.

As shown in Figure 1A, the turns of the input coil 29 extend over the magnetoresistors 23A, 23B 23C, and 23D, crossing them perpendicularly. Accordingly, the long sides of the magnetoresistors 23A, 23B, 23C, and 23D are perpendicular to the direction of the input coil 29. Thus, a current in the input coil 29 generates magnetic fields which are perpendicular to the input coil 29 and parallel to the long sides of the magnetoresistors 23A, 23B, 23C, and 23D.

Current in the input coil 29 flows in opposite directions over the magnetoresistors 23B and 23D. Therefore, the magnetoresistors 23B and 23D experience magnetic fields in opposite directions. Similarly, current in the input coil 29 flows in opposite directions over the magnetoresistors 23A and 23C. Therefore, the magnetoresistors 23A and 23C experience magnetic fields in opposite directions.

Independent claim 37 is directed to an integrated signal isolator having first and second ends. The integrated signal isolator comprises first and second isolator input terminals to receive a signal to be isolated, first and second isolator output terminals to provide an isolated output signal, first and second power supply terminals, first, second, third, and fourth

magnetoresistors, and an input strap. The first and second magnetoresistors are coupled in series from the first power supply terminal to the second power supply terminal, and the third and fourth magnetoresistors are coupled in series from the second power supply terminal to the first power supply terminal. The first isolator output terminal is coupled to a junction between the first and second magnetoresistors, and the second isolator output terminal is coupled to a junction between the third and fourth magnetoresistors. The first and second power supply terminals cause a current to flow in a direction though the first, second, third, and fourth magnetoresistors. The input strap has at least one turn coupled between the first and second isolator input terminals. The input strap is disposed with respect to the first, second, third, and fourth magnetoresistors so that a magnetic field is generated over the first and second magnetoresistors in one direction, and so that a magnetic field is generated over the third and fourth magnetoresistors in an opposite direction. The current through the input strap flows in a direction parallel to the direction of current flow through the first, second, third, and fourth magnetoresistors.

By the explicit disclosure in the Daughton patent at column 19, line 62 through column 20, line 17, independent claim 37 is not anticipated by the Daughton patent.

That is, this portion of the Daughton patent states that the magnetoresistors 23B and 23D are connected in series from the positive supply to ground, and that the magnetoresistors 23C and 23A are connected in series from ground to the positive supply. This portion of the Daughton patent also states that the junction between the magnetoresistors 23B and 23D forms one output of the bridge, and that the junction between magnetoresistors 23C and 23A forms the other output of the bridge.

This portion of the Daughton patent further states the magnetic fields in the magnetoresistors 23B and 23D are opposite to one another, whereas independent claim 37 requires these magnetic fields to be in the same direction. Similarly, this portion of the Daughton patent further states the magnetic fields in the magnetoresistors 23A and 23C are opposite to one another, whereas independent claim 37 requires these magnetic fields to be in the same direction.

Thus, independent claim 37 is not anticipated by the Daughton patent.

Independent claim 11 is directed to an integrated signal isolator having first and second ends. The integrated signal isolator comprises first, second, third, and fourth magnetoresistors and an input strap. The first, second, third, and fourth magnetoresistors are located between the first and second ends. The first and second magnetoresistors are coupled in series from a first power supply terminal to a second power supply terminal, and the third and fourth magnetoresistors are coupled in series from the second power supply terminal to the first power supply terminal. A junction between the third and fourth magnetoresistors is coupled to a first isolator output terminal, and a junction between the first and fourth magnetoresistors is coupled to a second isolator output terminal. The first and second power supply terminals cause a current to flow in a direction though the first, second, third, and fourth magnetoresistors. The input strap has at least one turn coupled between first and second isolator input terminals. The at least one turn has a first portion extending from the first end to the second end and running lengthwise alongside only the first and second

magnetoresistors and a second portion extending from the second end to the first end and running lengthwise alongside only the third and fourth magnetoresistors. The at least one turn is arranged so that current supplied to the input strap flows through the first portion in a first direction from the first end to the second end and through the second portion in a second direction from the second end to the first end. The first and second directions are substantially opposite to one another. The first and second directions of current flowing through the input strap are parallel to the direction of current flow through the first, second, third, and fourth magnetoresistors.

By the explicit disclosure in the Daughton patent at column 19, lines 50-61, independent claim 11 is not anticipated by the Daughton patent.

That is, this portion of the Daughton patent states that the long sides of each of the magnetoresistors 23A, 23B, 23C and 23D are substantially perpendicular to the input coil 29. Accordingly, contrary the recitations of independent claim 11, the input coil 29 does not have a first portion that extends between the first and second ends of the signal isolator and that runs lengthwise alongside only the first and

second magnetoresistors and a second portion that extends between the first and second ends and that runs lengthwise alongside only the third and fourth magnetoresistors.

Thus, independent claim 11 is not anticipated by the Daughton patent.

Moreover, independent claim 11 requires the first, second, third, and fourth magnetoresistors to be located between the first and second ends of the integrated signal isolator. Assuming that Figure 1A of the Daughton patent is viewed in landscape rather than in portrait, the first and second ends are either the top and bottom or the two sides of the page containing Figure 1A. However, the first and second ends cannot be the top and bottom of this page because independent claim 11 requires the first and second portions of the input strap to both run from one end to the other end and to run alongside a corresponding two magnetoresistors. As can be seen from Figure 1A of the Daughton patent, the portions of the input coil 29 running from the top to the bottom of the page and running from the bottom to the top of the page do not also run alongside any of the magnetoresistors 23A, 23B, 23C, and 23D.

Therefore, the first and second ends of independent claim 11 must be the sides of the page on which Figure 1a is printed, in which case the first and second portions of the input strap of independent claim 11 can only be the top and bottom horizontal portions of the input coil 29 because only these top and bottom horizontal portions of the input coil 29 run along magnetoresistors.

Thus, assuming that the top horizontal portion of the input coil 29, which runs along the magnetoresistors 23B and 23C, is the first portion of the input strap recited in independent claim 11, this first portion runs along the magnetoresistors 23B and 23C and not along the magnetoresistors 23A and 23D, as required by independent claim 11. However, contrary to the requirements of independent claim 11, the magnetoresistors 23B and 23C are not coupled in series from one power supply terminal to the other power supply terminal.

On the other hand, if it is assumed that the bottom horizontal portion of the input coil 29, which runs along the magnetoresistors 23A and 23D, is the first portion of the input strap recited in independent claim 11, then this first portion runs along the

magnetoresistors 23A and 23D and not along the magnetoresistors 23B and 23C, as required by independent claim 11. However, contrary to the requirements of independent claim 11, the magnetoresistors 23A and 23D are not coupled in series from one power supply terminal to the other power supply terminal.

For this reason also, independent claim 11 is not anticipated by the Daughton patent.

Independent claim 36 is directed to a semiconductor signal isolator having first and second ends. The semiconductor signal isolator comprises first and second isolator input terminals, first and second isolator output terminals, first and second power supply terminals, a semiconductor substrate, and first, second, third, and fourth magnetoresistors, an input strap, and a dielectric. The first, second, third, and fourth magnetoresistors are formed in at least one layer over the semiconductor substrate. The first and second magnetoresistors are coupled in series from the first power supply terminal to the second power supply terminal, and the third and fourth magnetoresistors are coupled in series from the second power supply terminal to the first power supply terminal. The first isolator output terminal is coupled to a junction between the

first and second magnetoresistors, and the second isolator output terminal is coupled to a junction between the third and fourth magnetoresistors. The first and second power supply terminals cause a current to flow in a direction though the first, second, third, and fourth magnetoresistors. The input strap is formed in at least one layer over the semiconductor substrate. The input strap has at least one turn coupled between the first and second isolator input terminals. The input strap is disposed with respect to the first, second, third, and fourth magnetoresistors so that a magnetic field is generated over the first and second magnetoresistors in one direction, and so that a magnetic field is generated over the third and fourth magnetoresistors in an opposite direction. Current flows through the input strap in a direction parallel to the direction of current flow through the first, second, third, and fourth magnetoresistors. The dielectric is between the input strap and the first, second, third, and fourth magnetoresistors.

By the explicit disclosure in the Daughton patent at column 19, line 62 through column 20, line 17, independent claim 36 is not anticipated by the Daughton patent.

That is, this portion of the Daughton patent states that the magnetoresistors 23B and 23D are connected in series from the positive supply to ground, and that the magnetoresistors 23C and 23A are connected in series from ground to the positive supply. This portion of the Daughton patent also states that the junction between the magnetoresistors 23B and 23D forms one output of the bridge, and that the junction between magnetoresistors 23C and 23A forms the other output of the bridge.

This portion of the Daughton patent further states the magnetic fields in the magnetoresistors 23B and 23D are opposite to one another, whereas independent claim 36 requires these magnetic fields to be in the same direction. Similarly, this portion of the Daughton patent further states the magnetic fields in the magnetoresistors 23A and 23C are opposite to one another, whereas independent claim 36 requires these magnetic fields to be in the same direction.

Thus, independent claim 36 is not anticipated by the Daughton patent.

Moreover because independent claims 37, 11, and 36 are not anticipated by the Daughton patent, dependent

claims 3-8, 12-15, and 31-33 are likewise not anticipated by the Daughton patent

Moreover, dependent claim 4 recites that each of the first, second, third, and fourth magnetoresistors comprises a serpentine structure having a plurality of elongated magnetoresistive portions coupled end-to-end, that the elongated portions of the first and second magnetoresistors are positioned near and in parallel to a first elongated portion of each of the turns of the input strap, that the elongated portions of the second and third magnetoresistors are positioned near and in parallel to a second elongated portion of each of the turns of the input strap, that the first elongated portions of the turns of the input strap carry current in a direction that is opposite to current carried by the second elongated portions of the turns of the input strap, and that the first elongated portions of the turns of the input strap are parallel to the second elongated portions of the turns of the input strap.

As shown in Figure 1 of the Daughton patent, the elongated portions of all magnetoresistors are perpendicular, not parallel, to the elongated portions of the input coil 29.

Accordingly, for this further reason, dependent claim 4 is not anticipated by the Daughton patent.

Dependent claim 5 is similarly not anticipated by the Daughton patent.

In section 4 of the Office Action, the Examiner rejected finally claims 1, 3-6, 11, 12, and 31-33 under 35 U.S.C §102(b) as being anticipated by the Torok patent.

The Torok patent discloses in Figure 3a a transpinnor 300 in which four magnetoresistors 302 are arranged in a bridge with a conductor 304 wound through the GMR films 302 as shown. The input of the transpinnor 300 is provided to terminals 306 and 308 and is completely isolated resistively from the output between nodes 310 and 312.

The Torok patent discloses in Figure 5a transpinnor 500 having an open-flux configuration. The transpinnor 500 is substantially the same schematically as the transpinnor 300. Thus, magnetoresistors 502, 504, 506, and 508 form a bridge. An input conductor 510 is wound as a single layer of magnet wire.

Independent claim 37 - The Torok patent does not show an input strap that is disposed with respect to first, second, third, and fourth magnetoresistors so that

a magnetic field is generated over the first and second magnetoresistors in one direction, and so that a magnetic field is generated over the third and fourth magnetoresistors in an opposite direction.

More particularly, independent claim 37 requires first and second power supply terminals coupled to the bridge. The Torok patent shows two power supply terminals, the plus side of the battery of Figure 3a (referred to herein as the B+ power supply terminal) and the minus side of the battery of Figure 3a (referred to herein as the B- power supply terminal). Thus, one possibility in applying Figure 3a to independent claim 37 is to designate the B+ power supply terminal as the first power supply terminal and the B- power supply terminal as the second power supply terminal. The only other possibility in applying Figure 3a to independent claim 37 is to designate the B- power supply terminal as the first power supply terminal and the B+ power supply terminal as the second power supply terminal.

If the first possibility is assumed, independent claim 37 recites that the first and second magnetoresistors are coupled in series from the first (B+) power supply terminal to the second (B-) power supply terminal. In this case, the first and second

magnetoresistors are the left-middle magnetoresistor 302 and the left-most magnetoresistor 302, respectively, as shown in Figure 3a of the Torok patent. Similarly, independent claim 37 recites that the third and fourth magnetoresistors are coupled in series from the second (B-) power supply terminal to the first (B+) power supply terminal. In this case, the third and fourth magnetoresistors are the right-most magnetoresistor 302 and the right-middle magnetoresistor 302, respectively, as shown in Figure 3a of the Torok patent.

Then, as can be seen by the way the coil 304 is wound around these magnetoresistors, the field that is produced by current through the coil 304 is generated over the first and second magnetoresistors (the left-middle magnetoresistor 302 and the left-most magnetoresistor 302) in opposite directions, contrary to the requirements of independent claim 37. Similarly, the field that is produced by current through the coil 304 is generated over the third and fourth magnetoresistors (the right-most magnetoresistor 302 and the right-middle magnetoresistor 302) in opposite directions, also contrary to the requirements of independent claim 37.

Therefore, independent claim 37 is not anticipated by the Torok patent. (An analysis of the second possibility produces the same conclusion.)

The Examiner also states that independent claim 37 reads on Figure 5 of the Torok patent. Again, if the first possibility described above is assumed, independent claim 37 recites that the first and second magnetoresistors are coupled in series from the first (B+) power supply terminal to the second (B-) power supply terminal. In this case, the first and second magnetoresistors are the magnetoresistor 502 and the magnetoresistor 508, respectively, as shown in Figure 5 of the Torok patent. Similarly, independent claim 37 recites that the third and fourth magnetoresistors are coupled in series from the second (B-) power supply terminal to the first (B+) power supply terminal. In this case, the third and fourth magnetoresistors are the magnetoresistor 504 and the magnetoresistor 506, respectively, as shown in Figure 5 of the Torok patent.

Then, as can be seen by the way the coil 510 is wound around these magnetoresistors, the field that is produced by current through the coil 510 is generated over the first and second magnetoresistors 502 and 508 in opposite directions, contrary to the requirements of

independent claim 37. Similarly, the field that is produced by current through the coil 510 is generated over the third and fourth magnetoresistors 504 and 506 in opposite directions, also contrary to the requirements of independent claim 37.

Therefore, independent claim 37 is not anticipated by the Torok patent. (An analysis of the second possibility produces the same conclusion.)

Independent claim 11 - As shown in Figure 3a of the Torok patent, the long sides of each of the magnetoresistors 302 are perpendicular to the coil 304. Accordingly, contrary the recitations of independent claim 11, the coil 304 does not have a first portion that extends between the first and second ends of the signal isolator and that runs lengthwise alongside only the first and second magnetoresistors and a second portion that extends between the first and second ends and that runs lengthwise alongside only the third and fourth magnetoresistors.

Thus, independent claim 11 is not anticipated by the Torok patent.

Moreover, independent claim 11 requires the first, second, third, and fourth magnetoresistors to be located between the first and second ends of the

integrated signal isolator. Therefore, all four magnetoresistors must be encompassed by the first and second ends.

Independent claim 11 also requires the first portion of the input strap to extend from the first end to the second end. Any portion of the input coil 304 shown in Figure 3a of the Torok patent that extends from the first end to the second end necessarily also runs along all four of the magnetoresistors 302 because that portion must extend from the first end to the second end and because the first and second ends encompass all four of the magnetoresistors 302.

However, independent claim 11 recites that this portion runs along only two of the magnetoresistors. Therefore, Figure 3a of the Torok patent cannot meet the limitations of independent claim 11.

For this reason also, independent claim 11 is not anticipated by the Torok patent.

An analysis of Figure 5 of the Torok patent produces the same conclusions.

In section 5 of the Office Action, the Examiner rejected claims 1, 3-17, and 31-36 under 35 U.S.C. §102(b) as being anticipated by the Wan patent or in the alternative, under 35 U.S.C. §103(a) as being

unpatentable over the Wan patent in the view of Torok patent or the Daughton patent.

The Wan patent discloses a first magnetoresistor 24, a second magnetoresistor 26, a third magnetoresistor 30, and a fourth magnetoresistor 28 forming a Wheatstone bridge. The first and second magnetoresistors 24 and 26 are coupled in series from a first power supply terminal 44 to a second power supply terminal 40/48, and the third and fourth magnetoresistors 30 and 28 are coupled in series from the a second power supply terminal 40/48 to the first power supply terminal 44. An input strap 70 produces a magnetic field over the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 in the same direction.

Independent claim 37 - The input strap 70 is not disposed as required by independent claim 37. That is, the input strap 70 is not disposed with respect to the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 so that a magnetic field is generated over the first and second magnetoresistors 24 and 26 in one direction, and so that a magnetic field is generated over the third and fourth magnetoresistors 30 and 28 in an opposite direction.

Instead, current flowing through the input strap 70, depending on polarity, enters the input strap 70 at the pad 66 and exits the input strap 70 at the pad 68. Accordingly, the current flows along the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 in the same direction producing a magnetic field over all of the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 in the same direction.

Moreover, the set-reset strap 54 is not disposed so that current flowing through it is parallel to the current flowing through the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28.

Accordingly, the Wan patent does not disclose a coil that meets the limitations of independent claim 37.

Therefore, the Wan patent does not anticipate independent claim 37 and dependent claims 3-10.

The Examiner alternatively combines either the Torok patent or the Daughton patent with the Wan patent under 35 U.S.C. §103(a).

However, the Torok patent suggests (see Figure 10) that each of multiple coils be coupled in a way not recited in independent claim 37. The Daughton patent

does not suggest that the input coil can have a different orientation and still function properly.

Accordingly, neither the Torok patent nor the Daughton patent suggests any modification of the Wan patent that would meet the limitations of independent claim 37.

Therefore, independent claim 37 and dependent claims 3-10 are not unpatentable over the Wan patent in the view of Torok patent or the Daughton patent.

Independent claim 11 - The input strap 70 is not disposed as required by independent claim 11. That is, the input strap 70 is not disposed with respect to the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 so that a magnetic field is generated over the first and second magnetoresistors 24 and 26 in one direction, and so that a magnetic field is generated over the third and fourth magnetoresistors 30 and 28 in an opposite direction.

Instead, current flowing through the input strap 70, depending on polarity, enters the input strap 70 at the pad 66 and exits the input strap 70 at the pad 68. Accordingly, the current flows along the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 in the same direction producing a magnetic field

over all of the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 in the same direction.

Moreover, the set-reset strap 54 is not disposed so that current flowing through it is parallel to the current flowing through the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28.

Accordingly, the Wan patent does not disclose a coil that meets the limitations of independent claim 11.

Therefore, the Wan patent does not anticipate independent claim 11 and dependent claims 12-17.

The Examiner alternatively combines either the Torok patent or the Daughton patent with the Wan patent under 35 U.S.C. §103(a).

However, the Torok patent suggests (see Figure 10) that each of multiple coils be coupled in a way not recited in independent claim 11. The Daughton patent does not suggest that the input coil can have a different orientation and still function properly.

Accordingly, neither the Torok patent nor the Daughton patent suggests any modification of the Wan patent that would meet the limitations of independent claim 11.

Therefore, independent claim 11 and dependent claims 12-17 are not unpatentable over the Wan patent in the view of Torok patent or the Daughton patent.

Independent claim 36 - The input strap 70 is not disposed as required by independent claim 36. That is, the input strap 70 is not disposed with respect to the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 so that a magnetic field is generated over the first and second magnetoresistors 24 and 26 in one direction, and so that a magnetic field is generated over the third and fourth magnetoresistors 30 and 28 in an opposite direction.

Instead, current flowing through the input strap 70, depending on polarity, enters the input strap 70 at the pad 66 and exits the input strap 70 at the pad 68. Accordingly, the current flows along the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 in the same direction producing a magnetic field over all of the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28 in the same direction.

Moreover, the set-reset strap 54 is not disposed so that current flowing through it is parallel

to the current flowing through the first, second, third, and fourth magnetoresistors 24, 26, 30, and 28.

Accordingly, the Wan patent does not disclose a coil that meets the limitations of independent claim 36.

Therefore, the Wan patent does not anticipate independent claim 36.

The Examiner alternatively combines either the Torok patent or the Daughton patent with the Wan patent under 35 U.S.C. §103(a).

However, the Torok patent suggests (see Figure 10) that each of multiple coils be coupled in a way not recited in independent claim 36. The Daughton patent does not suggest that the input coil can have a different orientation and still function properly.

Accordingly, neither the Torok patent nor the Daughton patent suggests any modification of the Wan patent that would meet the limitations of independent claim 36.

Therefore, independent claim 36 is not unpatentable over the Wan patent in the view of Torok patent or the Daughton patent.

In section 4 of the Office Action, the Examiner rejected claims 1, 3-7, 31-33, and 36 under 35 U.S.C. §102(b) as being anticipated by the Pant '590 patent.

The Pant '590 patent discloses in Figure 5 shows a first magnetoresistor R_1, a second magnetoresistor R_2, a third magnetoresistor R_3, and a fourth magnetoresistor R_4 which form four legs of a Wheatstone bridge. Pad A/A' is connected to a power supply, pad C is connected to ground, and pads B and D are output terminals that are connected to a differential amplifier to read the bridge voltage difference in response to a magnetic field.

The first and third magnetoresistors R_1 and R_3 are magnetized in one direction, and the second and fourth magnetoresistors R_2 and R_4 are magnetized in the opposite direction by a short pulse through the S-shaped strap placed on top of the first, second, third, and fourth magnetoresistors R_1, R_2, R_3, and R_4.

Accordingly, in terms of independent claims 36 and 37, the first and second magnetoresistors R_1 and R_2 are connected in series from the first power supply terminal A/A' to the second power supply terminal C, and the third and fourth magnetoresistors R_3 and R_4 are connected in series from the second power supply terminal C to the first power supply terminal A/A'. However, contrary to the limitations of independent claims 36 and 37, the first and second magnetoresistors R_1 and R_2 are

magnetized in opposite directions, and the third and fourth magnetoresistors R_3 and R_4 are magnetized in opposite directions.

Therefore, the Pant '590 patent does not anticipate independent claims 36 and 37. Because the Pant '590 patent does not anticipate independent claims 36 and 37, the Pant '590 patent does not anticipate dependent claims 3-7, 31-3, and 36.

In section 7 of the Office Action, the Examiner rejected dependent claims 7-10, 14, 17, and 34-36 under 35 U.S.C. §103(a) as being obvious over the Wan patent in view of the Torok patent. However, as discussed above, the Wan patent and the Torok patent do not disclose and cannot be combined to disclose the inventions of independent claims 37, 11, and 36. Therefore, dependent claims 7-10, 14, 17, and 34-36 cannot be unpatentable obvious over the Wan patent in view of the Torok patent.

In section 8 of the Office Action, the Examiner rejected dependent claims 7-10, 14, 17, and 34-36 under 35 U.S.C. §103(a) as being obvious over the Torok patent in view of the Wan patent. However, as discussed above, the Wan patent and the Torok patent do not disclose and cannot be combined to disclose the inventions of independent claims 37, 11, and 36. Therefore, dependent

claims 7-10, 14, 17, and 34-36 cannot be unpatentable obvious over the Torok patent in view of the Wan patent.

In section 9 of the Office Action, the Examiner rejected dependent claims 7, 8, 10, 14, 15, 17, 34, and 35 under 35 U.S.C. §103(a) as being obvious over the Torok patent in view of the Pant '278 patent. However, because the Torok patent and the Pant '278 patent do not disclose the inventions of independent claims 37 and 11, dependent claims 7, 8, 10, 14, 15, 17, 34, and 35 cannot be unpatentable over the Torok patent in view of the Pant '278 patent.

CONCLUSION

In view of the above, it is clear that the claims of the present application patentably distinguish over the art applied by the Examiner. Accordingly, allowance of these claims and issuance of the above captioned patent application are respectfully requested.

Respectfully submitted,

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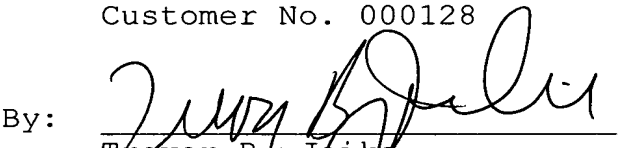
By: 

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